as their direction is concerned. A straight line will better represent them than any curve. The chances are enormously in favour of this being a physical system, and I have no doubt that will be shown to be the fact, but at present it is more a matter of probability than anything else. If these stars were a considerable distance apart, there would be hardly any doubt that the relative movement was due to proper motion. The two components, as one star, have a proper motion of 0″·227 in the direction of 79°·3, and this angle corresponds very nearly to the motion of B with respect to A. A line drawn through the observed positions of B, making an angle of 73° with the meridian, will represent the measures as closely as they are ever represented by a line of any character in stars of this class. To be sure, the later observations appear to indicate an accelerated motion, as would be expected if the path is a very elongated ellipse, but the errors in the series generally are so large it is impossible to deduce any harmonious result. Taking the mean of Struve's measures to represent the place of B at the mean date (1834·5), the movement of that star to 1891·3 is 0″·86, giving an average of 0″·015 per annum. If it is moving around the primary, as is most probably the case, it is evident that the apparent ellipse is one of extraordinary elongation. There is nothing like it known in the heavens. The period is certainly several hundred years. In one or two years more, the measures will definitely settle the character of this motion. It will probably be a difficult object for some time to come, and should be carefully measured by observers having sufficiently powerful instruments.

It will be noticed that the same grouping of positions, and apparent reversal of motion, occurs here in the first eight measures, which I have shown elsewhere is found in the measured places of all slow-moving pairs.

Lick Observatory:
May 29.

The Companions to Regulus. By S. W. Burnham.

The distant companion to *Regulus* was first observed by Herschel I. in 1779, and catalogued as No. 11 of his Class VI. It was measured on one night, but the distance was about 8″ too small. In 1821 it was better observed by South and Herschel, but the accurate measures commence with the observations of Struve a few years later. The measures of the last fifty years show conclusively that this companion has the same proper motion as *Regulus*, which has a motion in space of 0″·267 annually in the direction of 274°·5. Since the measures of Struve

the large star has shifted its place nearly 14″. The following measures are sufficient to show the relative fixity of the two stars:

1781·84	305°·1	168″·33	H 1*n*
1821·21	307·3	174·90	Sh 2*n*
1836·24	306·6	176·90	Σ 5*n*
1863·18	306·8	176·06	En 3*n*
1864·78	306·6	176·89	De 5*n*
1891·34	306·8	176·73	β 4*n*

Winlock, when at the Harvard College Observatory, found that the old companion had a very minute attendant, which had escaped all previous observers. He does not seem to have measured it, and the first observation with the micrometer is in 1877 by Hall. The following are all the measures to this time:—

1877·75	86°·4	3″·48	Hl 5*n*
1878·14	88·5	3·29	β 4*n*
1880·15	87·7	3·03	β 1*n*
1890·27	85·7	3·05	β 3*n*
1891·34	88·2	3·05	β 3*n*

These observations show that there has been no change in the angle during this time, and probably none in the distance, and, therefore, the new companion is moving through space with the other stars, and the whole probably form one vast system. During the period covered by these measures, B has moved 3″·3 by virtue of its proper motion, and the distance of C at the end of this time would be increased by that amount provided the movement was not common to both stars.

With most telescopes the close pair would be difficult. My first two sets of measures were made with the Chicago 18½-inch refractor. Clark has seen it with a 12-inch object-glass, and that is probably about as small an aperture as it could be fairly seen with. In the course of time there will doubtless be some indications of orbital motion in B and C, but the distance between them is too large for any rapid movement.

Lick Observatory, May 15.

The Orbit of 36 *Andromedæ* (Σ 73). By T. Lewis.

				h	m	s	
R.A.	...	...	...	...	0	50	4 } 1890·0
				°	′	″	
N.P.D.	...	...	...	...	66	58	3 }

Some time ago, having drawn the apparent ellipse for this binary, I was surprised to find that the companion had passed ap-astron. According to Doberck's elements, computed in 1875, this should not occur till 1973. Collecting all the published observations, I carefully plotted them on millimètre paper, and found that a satisfactory curve could not be drawn through them. By comparing neighbouring observations, a systematic difference between the observers was very apparent. The final personal equations deduced were :—

H_2.	−0°·5 and	″·00	Ta.	+1°·5 and	+0″·3
Σ.	−0·5 ,,	·00	Har.	−0·5 ,,	−·05
Sm.	−0·5 ,,	−·02	Gld.	+0·6 ,,	+·05
Md.	−1·4 ,,	−·02	Dob.	−0·3	...
Da.	+1·2 ,,	+·05	Sch.	−0·3	...
OΣ.	0·0 ,,	−·05	W. & S.	−0·5 ,,	+·04
De.	+0·7 ,,	+·05	Hall.	−0·5	...
Sec.	−0·3 ,,	+·10	Eng.	+0·2 ,,	−·05

The quantities are applicable to the observations with the given sign. For other observers an equation either could not be deduced or the material was insufficient. After correcting the position-angles for precession to 1890, and also for the P.E.'s, they were again plotted and a curve drawn, from which an ellipse was computed according to the method of Herschel. These elements were then corrected by Klinkerfues' method and the definitive elements obtained.

P	137·5 years	☊	123° 33′ (1890·0)
T	1819·7	λ	70° 0′
ϵ	0·67	a	1″·09
γ	44° 30′	μ	2°·62

Doberck's period is 349 years.

Below is a comparison between the observations as corrected for P.E. and precession, and those computed from the above elements.